Class will focus on financial aspects of economic markets.
Will probably have some in class projects. At least 1 exam, mid term. Maybe a final.

Data Sources

These will be useful sources of information if we do group projects. We will need stock and bond prices, data on GDP, etc.

- We will find where to obtain data on:
  - Interest rates and Bond prices
  - Equity prices, Financial data for companies and Analyst recommendations
  - Economic data
  - Forex prices
  - Portfolio data
  - Derivative Data (Hedging)
  - Options (foreign exchanges options, commodity options)

- I will discuss UConn Library resources
- I will also discuss certain websites that I have found useful over the years

Library Resources

- Databases for Economics
  - ABI/INFORM Global [THIS IS WHERE HE GETS 99% OF THE ARTICLES HE CITES IN CLASS] journal, newspaper, magazine. Good for research, especially newspaper based.
    - Full-text articles from 1800 journals covering business, finance, management and related functional ...
  - CenStats: U.S. Census Bureau Census info down to the town level. Also contains info on international trade. Inports and exports too at state level.
    - Business and demographic databases from the U.S. Bureau of the Census. CenStats databases include:&l...
  - D&B Million Dollar Database (North American Edition)
    - D&B's North American Million Dollar Database provides information on approximately 1,600,000 large US companies This source will have benchmark information for particular industries that are not just public companies. Includes private companies!
  - EDGAR
    - U.S. Securities and Exchange Commission database of filings of companies (10-K,10-Q, proxies, etc.) Stocks & Companies, 8K filings, 10K filings, 10 Q's

* Factiva
  - Full-text global news and business information service, combining the content sets of Dow Jones
* Global Insight (formerly DRI Basic Economics Database)
  - Global Insight contains many leading macroeconomic indicators for the United States of America. Good economics data, very useful information on USA. [prof had trouble accessing the other day?] Great data on money supply, interest rates, stocks, construction, housing, anything to do with the economy. Forecasting too. Good place for economic data, useful for personal investments.
* InfoTrac
  - This full-text, multidisciplinary magazine & journal database includes nearly 3,000 full-text ti... (sometimes will have something AVI Infor Track does not have).
* International Financial Statistics
  - Contains more than 26,000 annual, quarterly, and monthly time series of economic and financial stati...
  - Unfortunately, only available in the library
* Investext Plus
  - Investext Plus provides full-text access to information on the top brokerage firm, investment bank, and trade assoc. **Nice place for research reports.**
* LexisNexis Academic (the original)
  - Full-text access to thousands of publications, including national and international newspapers, popu... Lots of statistical information from the government.
* LexisNexis Statistical
  - LexisNexis Statistical provides the most comprehensive access to statistical data from federal gover...
  - Nice but information overload
* S&P NetAdvantage **EXCELLENT SITE**
  - Net Advantage brings together ten of Standard & Poor's investor information products: Traditional Bond guides, corporate records, information on credit ratings of secret companies, info on divedent records, earnings (past and projection), industry surveys. **TARIFFIC SITE, LOTS OF GOOD INFO, ONE OF THE BETTER SITES.**
* SourceOECD (not too useful here, stats compare across countries)
  - UConn has access to the OECD statistical databases ONLY. The Statistical Database Sets available fro...
* STAT-USA
  - Current U.S. and international business, economic, and trade statistics from the Department of Comme...
* Thomson Research (formerly Global Access)

- Thomson Research contains filings, quotes, investment research, and earnings estimates for U.S. and ... (finical info on companies)

* Value Line Investment Survey - Standard Edition
  - Value Line provides weekly reports on 1700 stocks, projections of key financial measures, and comme...

[Further points on some of the above research sites.]

ABI/INFORM Global
- ❑ Full-text articles from 1800 journals covering business, finance, management and related functional areas.
  - Useful for academic research.
  - Resource for many of the "journal" readings I have posted.

CenStats: U.S. Census Bureau
- ❑ Business and demographic databases from the U.S. Bureau of the Census
  - Also contains information on International Trade Data - Exports and imports by Standard International Trade Classification

D&B Million Dollar Database
- ❑ Useful for finding key ratios for industry groups.
  - Good for comparison purpose.

Global Insight
- ❑ Had trouble accessing yesterday but gives useful data on:
  - Financial Data: Money Supply, Interest Rates, Stocks
  - Construction & Housing
  - Industrial Statistics: Production, Capacity, Labour
  - Population Counts and Estimates
  - Forecasts
  - Foreign Trade and Interest Rates

Investext Plus
- ❑ Good source for research reports
- ❑ Also some forecast and data from trade associations

S&P NetAdvantage
- ❑ Bond guide,
- ❑ Corporation records,
- ❑ Dividend record,
- ❑ Earnings guide,
- ❑ Industry surveys,
- ❑ Mutual fund reports

Exchanges

If looking for information on stocks or the operations of financial markets don't forget to go to there web sites!

- All links listed below give useful information on the structure of the exchanges
- The American Stock Exchange

www.amex.com

  - Quotes on options, ADRs and ETFs
  - Info on exchange and trade funds

- NASDAQ

www.nasdaq.com

  - Quotes on stocks and ETFs
  - Info on exchange and trade funds (eg, vipers, spiders)

A Trade Fund is a trust where particular companies such as Barkely's has set up a vehicle to buy shares to track a particular index. So you could, for example, invest in the biotechnology sector in one diversified package. Or invest in NASDAQ or some other index. Bundles of tracking indices which you can invest in. ADI, American Depository Index (?)

- NYSE

www.nyse.com

  - Quotes and also good source for research articles

Websites

- **Fisher Department of Finance**

www.fisher.osu.edu/fin/\

  - Contains a link to a data finder that is the most comprehensive list of data sources

- **Yahoo Finance**

  - Still one of the best sites to find historical financial data
    Easiest place to get historical info on countries.

Game Theory

- What is a game?
- How do games arise in finance.
- What value do games bring to our analysis.

At an extreme, all situations are games. But we are specifically interested in situations where two parties use their actions to their own benefit, but their actions also effect the other player (the actions imply a strategic influence). A sort of competition or arrangement. An example would be how a company sets it's prices.
Which relationships arise in financial situations?

There are two values to our analysis. First it will answer some questions we may have, where other methods are difficult to implement. Second, the actual analysis (in a similar way to options) adds value through the process.

What one person does effects others options. This is game theory. Strategic independence.

What is a Game?

- More than one individual or player.
- Strategic interdependence.
- The rules of the game.
- The outcomes.
- The payoffs.

Single person games are not particularly interesting and can be dealt with through other methods. We are interested in cases where the outcome of a decision is not only effected by that decision but also by actions of other participants.

To describe a game we need a set of rules and decisions that can be made, the space of possible outcomes and the payoffs to each party given a certain outcome occurs.

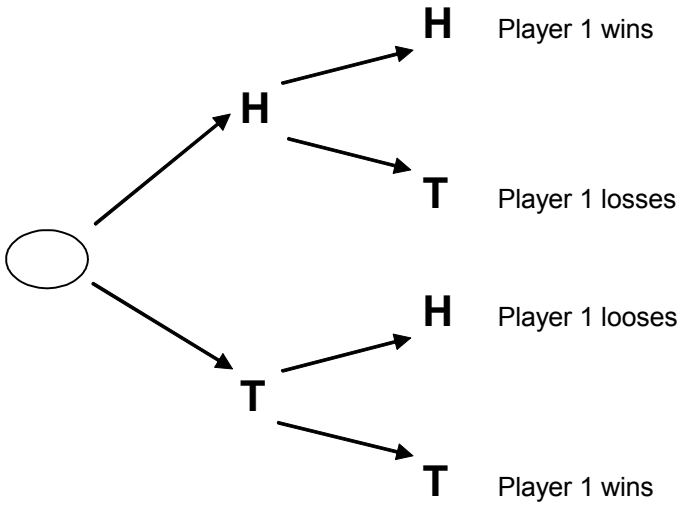
Given moves what are the outcomes Given these moves what does each party receive? May be uncertainty.

There must be some set of rules, we must know how the game is played and what we are allowed to do. The moves we can make. We need to know what the outcomes are for a given set of rules. Finally, we need to know what the payoffs are, given these moves what does each party receive. It does not have to be a certain payout, there can be uncertainty in the actual payoffs.

Simple Examples

❑ Matching pennies.

* Two players.
* Each places a penny down at the same time on a table.
* If both faces are the same player 1 pays player 2 one dollar.
* If the faces are different player 2 pays player 1 one dollar.



		Player 1	
		H	T
Player 2	H	(-1, 1)	(1, -1)
	T	(1, -1)	(-1, 1)

1 = wins a dollar,
-1 = losses a dollar
(player 1 is on right)

Here we are only trying to depict the different outcomes given the different choices. (Not implying that player 1 is going first and then player 2 is going)

This is what is described as a **zero-sum game** meaning What one player gains the other loses. In a sense this is a game of total conflict. Notice for small amounts such as this we probably assume that the payoff is measured in terms of dollars. If the bet each hand was $100,000, would this still be a fair assumption?

Is there a difference if it is played once or many times?

Simple game. Must consider how each player considers the amount of each bet. At some point we must consider the utility of the money, what it is worth to the player, the amount of satisfaction received from that money. (At some point the amount of each bet becomes meaningful to the player and causes them to reconsider). How player 1 views a million dollars compared to how player 2 views a million dollars may not be the same.

What is the best strategy to use here? We can see that if we play enough, in the long run we will break even. The answer is that we should use a random strategy. The best thing we can do is put the coin down on the table without looking at the face. THIS WAY OUR COMPETITOR WILL NOT BE ABLE TO OBSERVE A PATTERN IN OUR PLAY AND DEVISE THEIR OWN STRATEGY TO DEFEAT US. The optimal strategy is to play heads 50% of the time and tails 50% of the time and the choices must be random. The trick is to be able to figure out if the other guy is using the same strategy, if he is not you may be able to take advantage. This is called a **MIXED STRATEGY**

❑ Meeting in New York.

* Two players are separated and cannot communicate.
* They have agreed to meet for lunch at a set time but have each forgotten which of two restaurants they are meeting at.

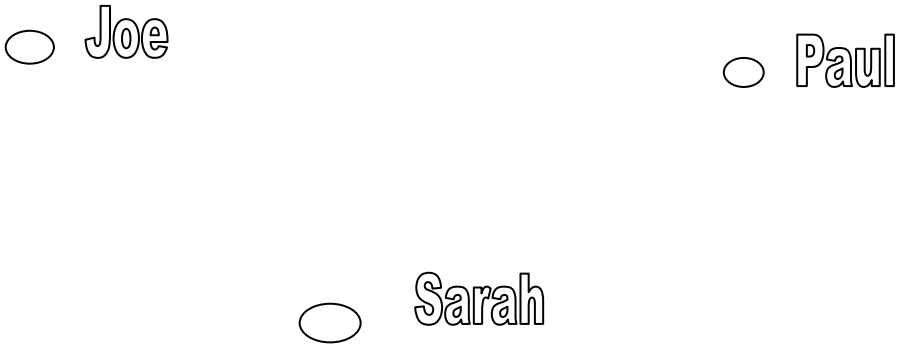
In this example the two players interest are completely aligned, they want the same thing. If they could communicate they can both benefit. **This game is not a zero-sum game**, **both players can win**, **both players can lose at the same time**. No dollars involved. If they both arrive at the same restaurant they both win. NON-ZERO SUM GAME.

Is there a strategy that is a winning strategy for either player. They can't communicate, all they can do is flip a coin.

No payoff and the two players are completely allied. They would benefit if able to communicate. **NON ZERO SUM GAME!**
What is the winning strategy? Can't communicate, best thing they can do is flip a coin.

❑ 3 People want to meet but do not like to travel.

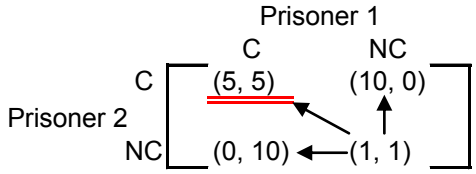
* How do they decide where to meet? Tough problem.



If Paul argues with Sarah too much Sarah can go to Joe and come up with an agreement to punish Paul. And visa-versa. This is a game of geometry. This example pertains to many real life situations including military and political.

❑ Prisoner's dilemma.

- We suppose that two accomplices to a crime have been arrested.
- They are held by police in two separate interrogation rooms.
- If neither player confesses then they both get prison terms of one year for a minor offence.
- If one confesses but not the other then one player gets 10 years and the other gets off.
- If both confess they get five years a piece.



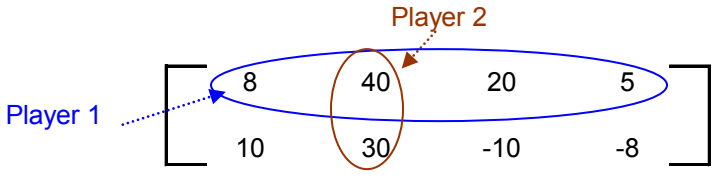
They both want to not confess and get the 1 year each. (1, 1) is an equilibrium point since both players want it. But the problem with this eq point is that it is very unstable because both players are tempted to cheat. If one of the players defects the other is punished very badly.

The players will tend to migrate to the (5, 5) equilibrium point because they both get 5 years (which is better than one getting 10).

So we have two eq points, one stable the other unstable. Problem is that the stable one just doesn't feel right. How can we decide on the best solution. Consider the game diagram. Has either player a strategy that is a winning strategy. In this example, what could we consider to be an equilibrium? Are either equilibriums "quality" equilibriums?

Two-Person, Zero-Sum Games

- **In zero-sum games, what one participant wins, the other loses**.
- Consider the following game depiction.



In this game player 1 has two choices (or strategies) the top row or bottom row, player 2 has four choices according to the columns. Suppose 1 employs his first strategy and 2 employs his second. What are the payoffs? In equilibrium, how can we find the optimal strategies? First a min-max argument. Next a dominance argument. Define a saddle point.

Example, if both players play strategy 1 than player 2 gets minus 8 and player 1 gets plus 8. If player 1 plays strategy 1 and player 2 plays strategy 3 than player 1 gets 20 and player 2 gets minus 20.

Want to optimize: say player 1 always plays strategy 1, than player 2 will always play strategy 4 in order to minimize his losses. Player 2 always wants to play strategy 3 or 4 so she will receive money. Player 2 never wants to play strategy 1 or 2. We can use the dominance argument to knock out strategies. For player 1, strategy 1 always beats strategy 2. Now player 2 has to decide if 3 or 4 is better, given that player 1 is always going to play strategy 1. In this case player 2's best bet is to play strategy 4, this holds the possibility of a win which will offset the loss.

The optimal strategy is the player 1 plays strategy 1 and player 2 plays strategy 4. Here we have gone through the reasoning and knocked out strategies and reduced the form of the game.

The optimal strategy is called an equilibrium point or saddle point.

Two-Person, Zero-Sum Games

- In the previous example, there was an equilibrium in pure strategies.
- This is not always the case, even in such simple games as two-person, zero-sum games.
- Consider the following game.

		Player 2			
		-2	4	-1	6
Player 1		3	-1	5	10

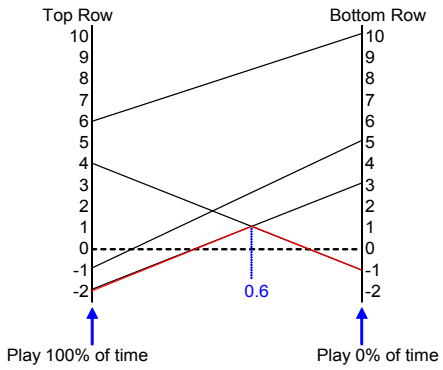
Do we have any dominant strategies? (0.4,0.6), (0.4,0.6).
We have in effect developed a randomized strategy. There is no pure strategy that can be played by either party. The highest expected payoff is generated by randomizing each parties strategy. How do we actually find these solutions?

Player 2 would never play strategy 4 because strategy 2 dominates. Nor will player 2 play strategy 3 because strategy 1 would be more in his interest, he wins with a -2 and is less worst off loosing with a three.

Player 1 will want to play strategy 2 but if he does player 2 will play strategy 2. Likewise, if player I plays strategy 1 player 2 will play strategy 1.

At this point we cannot eliminate any further. In the previous examples the solutions were pure strategies, but we cannot reach that point here. At this point we need to use MIXED STRATEGY to win. In this case both players must randomize their moves between the remaining strategies.

If you are predictable the other player can benefit.
There is a theory in game theory that says if we play this game one round after another and if we choice the strategy for this round which would have beaten the opponents strategy used in the last round then we will end up converging on the solution. Can also solve by repeated trials. Can also solve using geometry (below).Ultimately, regardless of how you solve for the optimal, you will find the optimal solution is given by player 1 playing strategy 1 40% of the time and player 2 also playing strategy 1 40% of the time. Must use a random number generator to which of the strategies you play in a particular trial, say a random number 1 through 10, if 1 through 4 play strategy 1 otherwise play 2.



Two-Person, General Games

- Players are not simply splitting the gains.
- There are many general possibilities.
  - Coordination.
  - Side payments.
- Multi player games.
  - Coordination.
  - Alliances.

Most games are not zero sum. Real interest arises when parties can act in concert.

IF THEY CAN BOTH WIN OR THEY CAN BOTH LOSS IT IS NOT A ZERO-SUM GAME.

In these cases the solution becomes more complicated. Because there may be value to coordination, there may be value to side payments, there may be value to bribery or punishment. If there are multiple players coordination and alliances are important.

Each benefit that a particular person brings to the situation becomes important.

Statistics Refresher

Prof has used info from www.statsoft.com/textbook/stathome.html extensively in what follows.

Why Are We Interested In Statistics?

- Classic economic theory suggests that risk as measured by BETA should explain expected returns
  - Do other factors play a role?
- If markets are efficient (in some sense) then public information should be immediately priced
  - Is this the case?
- Do option prices do a good job of predicting future volatility?
- So we shall be interested in estimating the relationship between variables

So we might use statistics to try and answer the question: Does Beta predict expected returns? Some people believe that the "capend" (?) does not have enough factors to fully explain risk, believe other factors should be included. Oil prices, Inflation, those factors.

We could test weather those factors are important using regression analysis. If markets are efficient than public information should be immediately PRICED on the market. This type of efficiency is called SEMI-STRONG EFFICIENCY. Is this the case? There are numerous tests designed to try and answer this question.

Example, a company decides to cut it's dividends. Is that cut immediately reflected in the stock prices? If markets were efficient the public information should be immediately noticed in price. Do the markets over or under react? We can use statistics to test weather or not there is any inefficiency in the market.

One of the parameters used to price an option is the underlying asset volatility. What we could say is, if I had publicly traded options I could turn the process around and say that option prices predict future volatility. And we could test this. We could look at option prices today and calculate implied volatilities and see if those implied volatilities turned out to be correct.

Other sorts of tests: orange futures, they actually predict the weather better than the government meteorologists. People invest tens of billions of dollars in orange futures every day and thus have a reason to do better than the meteorologists.

For all of these things we will need a methodology to test these issues.

We will be interested in estimating the relationship between variables.

Implied Volatility versus Actual Volatility

Beta, expected returns, and actual returns. Oranges juice prices and the number of freeze days in a month.

Elementary Concepts in Statistics

- On the spreadsheet: Statistics Refresher, I have compiled the daily returns for the S&P 500 Index and the Dow 30 component Exxon
- First, we calculate the daily returns for each data set
  - Note, some price changes are for more than one day

Refer to the Statistics Refresher spreadsheet, first tab, stats. This is a group of 500 largest stocks, the S&P Index. Columns for each company are:

Date Open High Low Close Volume Adj. Close* Daily Return

Adjusted Close is adjusted for any stocks, _____, or dividends. (?) This info for each company.

First thing we want to do is calculate a daily percentage return. What we are interested in is the daily return. So we have the closing price today (P1) and the closing price yesterday (P0). We want to know what the return was for that particular day. (yesterdays is the one below)

$$RET = \frac{P1 - P0}{P0} = \frac{\text{dollar change}}{\text{previous days close}} = \%\ \text{change}$$

We want daily returns but we know that we do not trade every day. Want daily but change over weekend is 3 days worth of returns! How can we get daily?

Price when I bought, P0. Whatever the daily return is, that would give me the price the next day.

$$P0*(1 + RET) = \text{Price Next Day} = P1$$

If we hold it for another day (assumption is that the price does not change on days the stock is not traded) we would have:

$$P0*(1 + RET)*(1 + RET) = P2 = \text{Two Days Growth}$$

After 3 days…

$$P0*(1 + RET)*(1 + RET)*(1 + RET) = P3 = \text{Three Days Growth}$$

Lets reduce and solve this 3 day equation…

$$(1 + \text{RET})^3 = \frac{P3}{P0}$$

$$\text{RET} = \left(\frac{P3}{P0}\right)^{\frac{1}{3}} - 1$$

Adapt this to the spreadsheet, use STATS tab, cell Q7 as an example:

$$= \left(\frac{P7}{P8}\right)^{\left(\frac{1}{J7-J8}\right)} - 1$$

where J7 and J8 are Excel date entries which will return the number of days between the two dates. P7 and P8 are the corresponding closing values on those dates.

Exxon

Date	Open	High	Low	Close	Volume	Adj. Close*	Daily Return
19-May-06	59.9	61.04	59.5	60.45	26682500	60.45	0.94%
18-May-06	60.25	61	59.86	59.89	19108000	59.89	-0.48%
17-May-06	61.45	61.74	59.94	60.18	26217600	60.18	-2.87%
16-May-06	62.11	62.71	61.54	61.96	15826300	61.96	-0.06%
15-May-06	61.51	62.48	61.35	62	19512200	62	-0.13%
12-May-06	63.46	63.5	62.06	62.24	19198600	62.24	-1.92%

Now we may want to calculate the daily average and variance of the returns.

$$\overline{\text{RET}} = \frac{\sum_{i=1}^{n} R_i}{N} \qquad \sigma^2_{\text{RET}} = \frac{\sum_{i=1}^{n} (RET_i - \overline{RET})^2}{N-1}$$ (note it's the SAMPLE VARIANCE)

$$\text{Standard Deviation} = \sqrt{\sigma^2_{\text{RET}}} \qquad \text{Coeff. of Var.} = \frac{\text{STD DEV}}{\overline{RET}}$$

The Excel functions we would use are:

Average(A1:A100) VAR(A1:A100) STDEV(A1:A100)

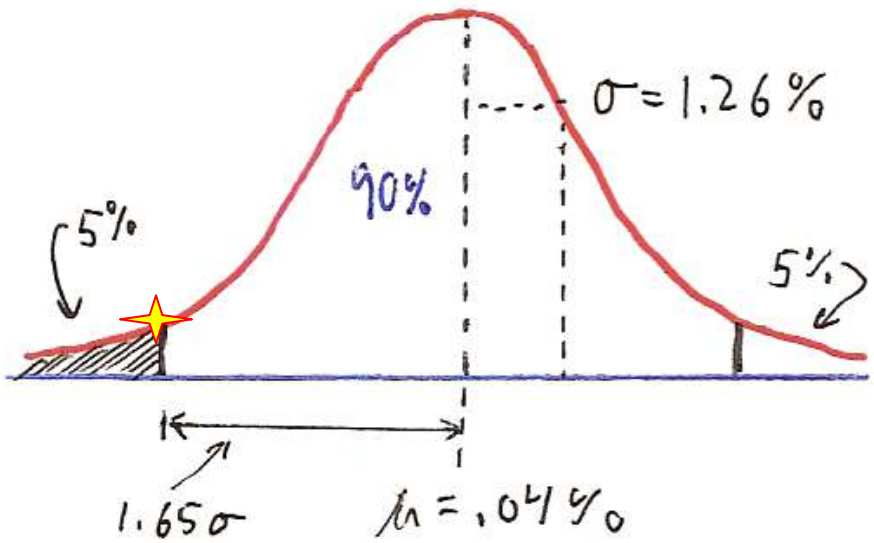
	Mean	Variance	Std Dev
S&P 500	0.02%	0.000078	0.88%
Exxon	0.04%	0.000158	1.26%

Mean, Variance, Standard Deviation, Coefficient of Variation

- Mean of the daily returns
  - Use of the AVERAGE function
- Variance of the daily returns
  - Use of the VAR function
- Standard deviation of the daily returns
  - Use of the STDEV function
- Coefficient of variation of the daily returns
  - Use of the VAR function

Now we are interested in the question: On a bad day how much do I stand to loose?

First we define a "bad day." How bad is a bad day? Often people use the standard of 5 percent, a 5% bad day. This means on 1 in 20 days we expect we will loose some percentage of the value of our shares in the stock. What is the probability of this? We have a normal distribution representing the distributions of daily returns for the Exxon data and we have it's mean and standard deviation from the calculations above. So we are going to find where in this distribution the 5% falls (it will be -.0204, see below).



We are looking at the probability in the bottom 5% of the tail which is 1.65σ away (2 or 3 sigma) from the mean:

$$\mu - 1.65*\sigma = 0.04\% - 1.65*1.26\% = -2.04\%$$

Say we invest $10,000 and have a "Bad Day". The loss would be

10,000,000 * -.02039 = -$203,578.01

So on a 5% bad day (1 bad day in 20) we are **exposed at about the 2% loss level**. This give me an idea of my exposure.

WHAT ARE VARIABLES

- Variables
  - Variables are things that we measure, control, or manipulate in research.
- Dependent vs. independent variables
  - In estimating the impact of beta on actual returns, beta could be called the independent variable and actual returns the dependent variable

In our Hypothesis we will be trying to say that our actual returns are predicted by Beta. Beta effects actual returns (it's the x variable, the independent variable).

Relations Between Variables

- Two or more variables are **related** if in a sample of observations, the values of those variables are distributed **in a consistent manner**.
  - In other words, variables are related if their values systematically correspond to each other for these observations.
  - So for example we may find (or we may not) that high beta companies have high returns.

Is there a pattern on the scatter diagram? That would indicate a relationship. A systematic link.

Example

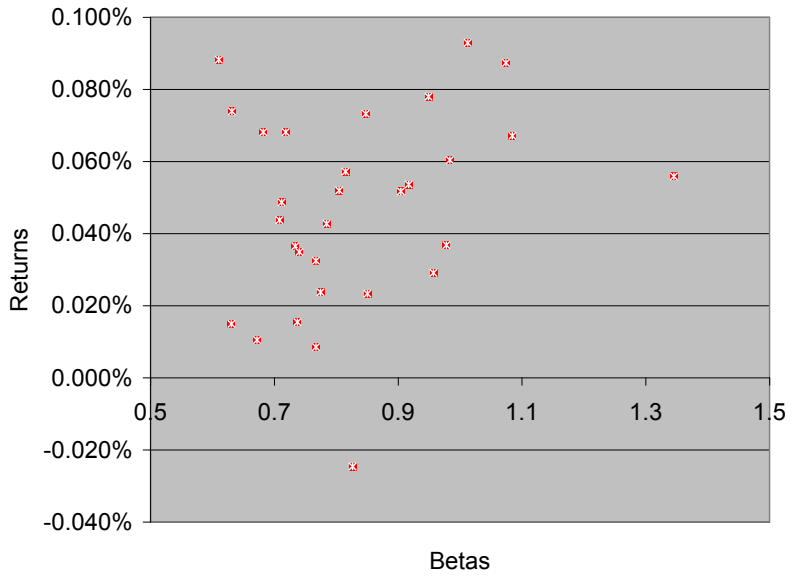
- On the spreadsheet: Statistics Refresher, I have compiled the daily returns for the Dow 30 Index, the S&P 500 Index and the Dow 30 components for the period 10th July 1986 through 10th June 2005
  - Approximately 4,900 returns for each
  - Calculate beta (vs S&P 500) for the first ½ of the observations
  - Compare to average expected return for the second ½ of observations

Dow 30 Index is an index of the 30 larger-est US companies. Not necessarily the largest but a good mix of companies. Microsoft, 3M, Alcoa…

On the BETAS tab of the spreadsheet we have calculated the Daily Return in exactly the same way we did for Exxon above. It is calculated for Dow Jones Ind, S&P500, and each of the component companies of the DOW 30 back to 1986.

What we will do is calculate Beta based on the first decade of data. We will then compare that data to the actual returns of the second set of data. (working with two halves of the data, each is one decade). Idea being if a company was risky in the first decade they were probably risky in the second decade. We are equating risk with return, higher risk stocks should provide a higher return.

Now plot actual returns v actual betas:

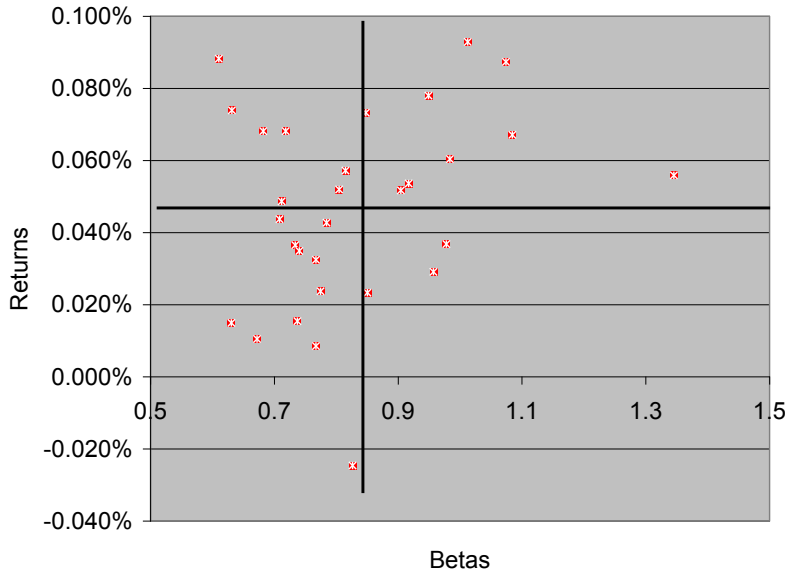


We want to see weather the first decade beta has an impact on the second decade actual returns. If Exxon Mobile is risky in the first decade did it receive higher returns in the second decade?

Is there a pattern in our above scatter diagram? Seems to be some pattern, lower beta companies seem to have lower returns and higher beta companies seem to have higher returns. How can we actually measure how real this relationship is?

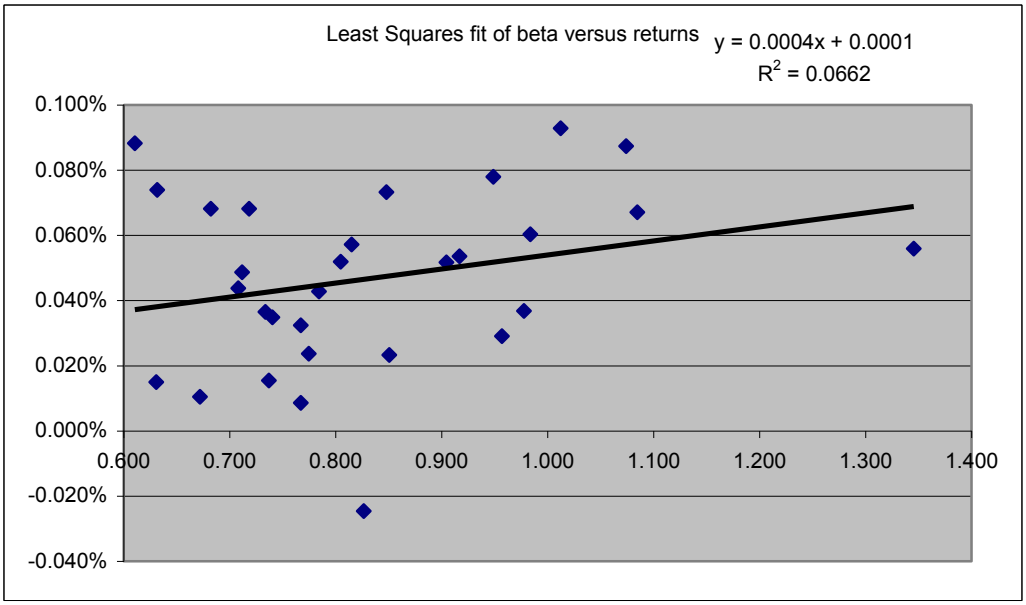
But before we look at that consider the averages of the two data sets, return and beta (below)…

The average values are 0.83 and 0.047%



The average beta for the DOW 30 is about .8, suprising, would think it would be closer to 1 9the average of the whole market is 1). And the average return is just over .047%.

So can we tell when the two things are linked? To do this we need to perform a regression analysis. We will examine several ways. One is to put a straight line through the data so that it is a best fit. We want to see if we can predict actual returns based on the beta of the company.



What is it telling us? Whatever the beta is, this gives us the relationship between the beta and the actual return. It does seem to confirm that we have some sort of trend.

Now we would like to look at how good the trend is, how strong. To do this we'll use the Excel regression data analysis tool.
On the Betas tab, Tools|Data Analysis|Regression
The **Y** range is the **RETURNS,** The **X** range is the **BETAS**
The equation returned is **Y = .00043*X + .0001087**
So this is our second way to do a regression analysis.

Beta	Mean Return
0.682	0.068%
0.734	0.037%
1.012	0.093%
0.632	0.074%
0.848	0.073%
0.740	0.035%
0.767	0.009%

Beta	Mean Return
0.905	0.052%
0.917	0.054%
0.826	-0.025%
0.949	0.078%
0.805	0.052%
0.978	0.037%
0.708	0.044%
1.085	0.067%

Beta	Mean Return
0.815	0.057%
0.850	0.023%
0.957	0.029%
0.775	0.024%
0.712	0.049%
0.767	0.032%
0.737	0.015%

Beta	Mean Return
1.074	0.087%
1.345	0.056%
0.784	0.043%
0.631	0.015%
0.610	0.088%
0.672	0.010%
0.984	0.060%
0.718	0.068%

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.25727869
R Square	0.06619232
Adjusted R Square	0.03284205
Standard Error	0.00026804
Observations	30

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1.42595E-07	1.42595E-07	1.984761	0.169898611
Residual	28	2.01166E-06	7.18448E-08		
Total	29	2.15425E-06			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.0001087	0.000259789	0.41841459	0.678836	-0.000423455	0.000640854
Beta	0.00043099	0.000305923	1.40881546	0.169899	-0.000195666	0.001057643

Usually there will be some variation of the observed points around the predicted points, a scatter around the line. This difference is called the **residual value**. The least squares method minimizes the residual error overall, line which minimizes.

Why are we interested in the slope? Because given a particular Beta, the slope tells us how much the actual returns are expected to be. Also consider the **95% upper and lower confidence level**. What this is telling us is given the data points and the regression, how far could we be wrong on the slope or intercept? Telling us the possible range of the slope and intercept. Notice in this case the range crosses 0 meaning that there is an actual chance that beta is 0 and the regression is useless (meaning there is actually no connection between the two parameters). Under these conditions we would not use this regression. Also consider the **P value** which tells us how good our estimate is, how likely our estimate is a good predictor of what is actually happening. For beta, the slope, the P value is .169899, roughly 17%. What this is saying is that 17% of the time we could have gotten this result just by random chance. This is not really good, would like it less than 5%. This is another indicator that the model is not a good predictor. **R Square** gives us an idea of how good our line of best fit really is. How

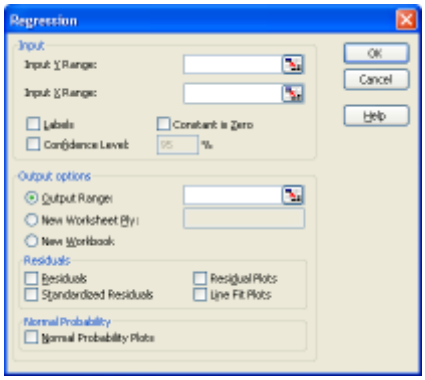
much of the variability is explained by the independent variable. In our case R Squared is .0662, the range of R Square is 0 to 1. An R Square of 1 means that the independent variable perfectly explains the dependent variable. An R Square of 0 means there is no relationship. Our model is at about 6%, pretty low. This is saying that beta is giving us only a small idea of what is going on with the actual returns. There are probably other variables which should be included in the model.

A high P Value will overrule a low R Square value, the low R square value just means there are other things going on as well. Now we would like to look at the Significance F value, 0.1699. In this case significance F is the same as the P Value. This is because we only have 1 independent variable. Significance F tells us how well the whole model works. If we were using more than one independent variable this would be more pertinent.

Non-Numerical Independent Variables, for example, when people look at stock returns it appears that returns are higher in January than in other months of the year. Say we wanted to test this, how would we? The beta value is easy, it's just a number. We would use an independent variable, we would assign a value of 1 if the month we are looking at is January, and a value of 0 otherwise. Now when we run the regression the slope associated with the January variable will tell me how important the January event was. Give it a value of 1 if it happens, a 0 when it doesn't happen.

So in this very simple test we have not seen a strong relationship between beta and the actual returns.

About the Regression dialog box



Input Y Range
Enter the reference for the range of dependent data. The range must consist of a single column of data.

Input X Range
Enter the reference for the range of independent data. Microsoft Excel orders independent variables from this range in ascending order from left to right. The maximum number of independent variables is 16.

Labels
Select if the first row or column of your input range or ranges contains labels. Clear if your input has no labels; Excel generates appropriate data labels for the output table (kind of).

Output Range
Enter the reference for the upper-left cell of the output table. Allow at least seven columns for the summary output table, which includes an anova table, coefficients, standard error of y estimate, r2 values, number of observations, and standard error of coefficients.

Supply and Demand

❑ I have used info from
The Economist, CyberEconomics, and Wikipedia, the free encyclopedia extensively in what follows.

Why Are We Interested In Supply and Demand?

❑ We will study why security prices change

* **Need an understanding of factors that effect supply and demand, and**
* **How these factors interact.**

We will be looking at economic markets, principally with an eye toward financial markets. We need to understand how supply interacts with demand. What factors effect supply, what factors effect demand. We will need to understand what forces effect price so we can recognize patterns. This will allow us to begin to understand how these markets work.

Background

❑ The theory of supply and demand usually assumes that markets are perfectly competitive.

* **Many buyers and sellers in the market, and**
* **None of them have the capacity to influence the price of the good.**
  - **When we consider securities, is this realistic?**

Perfect competition would require:

(what do we mean by perfect competition)

① **Atomicity**, there are a large number of small producers/investments and consumers/investors on a given market, each so small that its actions have no significant impact on others, firms/companies/governments are price takers.

Large number of participants in the market. This means the actions of a particular group will not have a significant impact on the market. One buyer does not dominate the market enough to make a move which effects the market. Many suppliers and many customers.

② **Perfect and Complete Information** as regard to market prices. All of the participants in the market understand all of the information which is necessary to price a particular asset.

③ **Free entry**, any firm/company may enter or exit the market as it wishes. There are no barriers to entry. Regulatory issues are one example. At other times there is a barrier to free entry which has nothing to do with regulation and government. Such as cases where there is a huge investment required. For example, a company which has made a large investment to gain a particular market can, when necessary, reduce their prices to prevent another company from pursuing an investment to try and get into that market.

What about Global Trade? Tariffs are real barriers to entry. Agriculture for example. Sometimes a barrier to free entry can be geographic, it may not make sense to ship a product around the globe if it will rot (agriculture) before the customer has a chance to purchase it. Quotas are another barrier, can stop people from entering a market.

④ **Zero Transaction Costs**. The price is determined at the level that equates supply and demand. For example, there is no distribution cost, no cost to purchase anything, no commissions. Means I can buy the good for the price that I can see (?).

Toward the end of the semester we will look at monopolies and duopolies and will see that we do not have perfectly competitive markets in these cases.

If we think about securities such as stocks and bonds, do they meet the 4 above criteria? Typically when we talk about these kinds of competitive markets we are speaking of real assets, not financial assets.

Lets examine financial markets, try working down the list.

Stocks & Bonds:

Large number of suppliers and consumers of stocks and bonds? YES (if we exclude small companies who may not be able to supple enough for the entire demand).

Complete Info? There are regulations which require companies to disclose information. And there are laws which prevent people on the inside from trading with inside info. So we can say YES, possibily.

Free Entry, can anyone buy and sell stocks and bonds. YES, for the most part.

Zero Transactions Costs? Probably not, there are certain transaction costs associated with stocks and bonds. But certain institutions have arisen to make sure these transaction costs are as low as possible.

So no market is ever perfect in a competitive sense but we are probably pretty close when we speak of financial markets.

In a perfect market price is set by the interaction of supply and demand.

Demand

- Demand is that quantity of a good/asset that consumers/investors are not only willing to buy but also have the capacity to buy at the given price.
- A ***demand schedule*** can be constructed that shows the quantity demanded at each given price
  - **The main determinants of the quantity one is willing to purchase will typically be:**
    - **the price of the good**
    - **one's level of income**
    - **personal tastes**
    - **the price of substitute goods**
    - **and the price of complementary goods**

We will see in a future class that demand must be considered on an individual or company or government (a sole entity) basis. Here we are talking about aggregate demand, the demand in the whole market place.

Demand Schedule: a line constructed to show how much goods people want to consume or invest in given a particular price.

Generally, as a good cost less the demand will increase. Your level of income will impact your personal demand schedule. If you do not like something (personal taste) you will not buy it at any price.

Substitutes and Compliments

- Goods/assets that are substitutes satisfy the same set of goals or preferences (can be used in place of a particular good or asset).
- The opposite of a substitute is a complement, a good/asset that helps complete another in some way
  - **Think of examples as they relate to stocks, bonds and forex (forex = Forgein Exchange).**

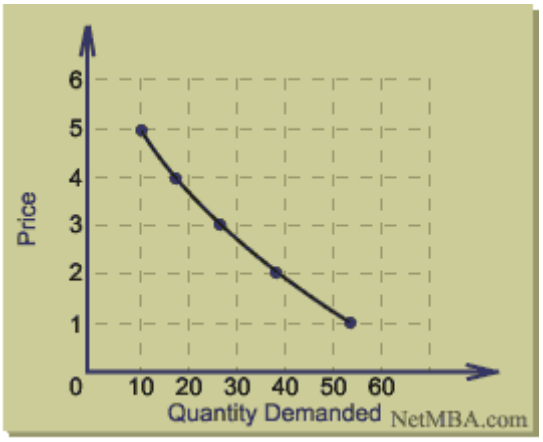
There are relatively few perfect substitutes except between two goods of the same kind. Much more common is for goods to be ***imperfect substitutes*** for one another. Compact discs and cassettes, for example, can both be used for the same purpose (as media for recording and replaying sound), but there are significant differences between the two in terms of durability, sound quality, and the cost of the recording media and the equipment used to record on it. As a result the two can be substituted for one another, but there are significant trade-offs involved in deciding to substitute one for the other: if you buy a tape instead of a CD, you may pay less, but you will get lower sound quality and a less durable good; if you buy a CD instead of a tape, you may get better sound quality but you will pay more and you may not be able to listen to the CD in your car. Nevertheless, CDs and cassettes are substitute goods (though only imperfectly): and so if changes in the market tend to erode the advantages of choosing cassettes over CDs (such as a decrease

in CD prices or increased availability of car CD players) it will tend to increase the demand for CDs and decrease the demand for cassettes. Coffee/Tea. Coke/Pepsi.

A ***complementary good*** (or complement good) is a good that should be consumed with another good. In economics, it is a good whose **cross elasticity** of demand is **negative**. This means that if more of Good A were bought, more of Good B would also be bought if they were complements. An example of complement goods are hamburgers and hamburger buns. If the price of hamburgers falls, more hamburger buns would be sold because the two are usually used together. Cars / car tires.

A ***perfect complement*** is a good that has to be consumed with another good. Many goods in the real world exhibit characteristics close to perfect complementariness. An example would be a pair of shoes (generally need two).

A particular demand schedule will be dependent on how many substitutes there are for a good and weather or not there are complements for the good.



Generally a demand schedule looks like this, as the price goes up the demand goes down. Generally the line will be steeper if there are more substitutes. That is, more substitutes means greater supply which will have the effect of tightening the price range creating a steeper slope on that axis. Example, Pepsi and Coke. If the price of Coke increases the demand of Pepsi, at a lower price, will increase because there is a ready substitute.

If there is no substitute in a market and the price of the good goes up you will have to pay it, the line will be pretty straight on the price axis.

Are there substitutes for stocks, bonds, and forgein exchange? For instance, if I can't buy Microsoft stock is there a substitute? Yes, there are other high tech firms that will sell stock even if not a perfect match for Microsoft. If I wanted to invest in biotechnology and I could get a particular company I could get stock of another biotech firm.

Are there any complements in stocks and bonds and forgein exchange? Yes, there are some stocks which do better when another stock is in demand (we will se this in a few classes). Same idea holds for bonds, if 3 year is too expensive I can change to the 5 year.

Not a perfect substitute but it will do. Some would argue that a hedge fund could make a perfect substitute because of the size of the fund it can create.

What about forgein exchange? Suppose I have a large investment in a very small far eastern country. I am exposed to that countries currency. If the currency in that country plummets I am going to suffer losses. What would I like to do? I might like to hedge. I could barrow local currency to invest. Or maybe I would like to use some sort of derivative. But there may not be a very active or liquid derivative market for that currency because it's just too small. So what to do instead. Maybe use derivatives priced over the yen, wouldn't be perfect because the local currency will have a mind of it's own. But if it's tied into the aggregate far eastern economy then it is likely to move with the yen to some degree. So although I couldn't hedge perfectly, that particular derivative may be a good substitute for what I can't physically get (or what actually made it too expensive). (can reach a point where the derivative is too expensive to make it worth it)

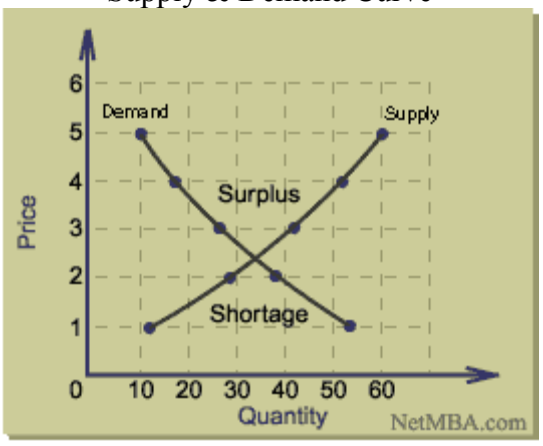
Supply

- Supply is the quantity that producers/companies/governments are willing to issue at a given price.
- **The main determinants of supply will be the market price of the good/asset and the cost of producing it**
  - **In terms of classical supply and demand for goods cost of production is a simple concept, what would be the analogy for financial assets?**

This will be tied into the theory of how much of a good a firm is willing to produce given it's cost structure. This is what we mean by **supply; given a certain price what is the optimal output for a given firm**.

There may be economies of scale. If I can sell a billion widgets I may be able to do it at a price cheaper than I could for a 100,000 widgets. Usually as the price for a good goes up, the market supply of that good also goes up.

Supply & Demand Curve



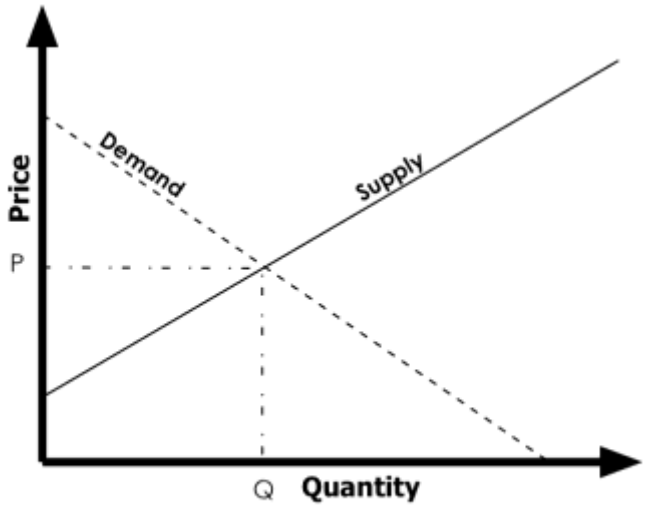
How do we relate supply and cost to financial assets? What is the cost of producing the stock (and issuing it). Is it free to issue stock? What is the cost of issuing stocks?

Well if I am a stock holder in a company I want the company to avoid issuing more stock as to not dilute the values of my shares. But at the same time I'm hoping that is the company does issue more stock it will use the revenue to invest in the company in a way which will increase the share price.

At a basic level the cost of issuing the stock is the cost of dilution. The revenue from issuing of stock must be reinvested or else ownership is diluted. Management doesn't like to issue stock because it dilutes their concentration of control as well.

Simple Supply and Demand Curves

- The slope of the demand curve (downward-to-the-right) indicates that a greater quantity will be demanded when the price is lower.
- The slope of the supply curve (upward-to-the-right) tells us that as the price goes up, producers/issuers are willing to produce/issues more goods/assets.



We usually assume that the demand schedule is downward sloping and supply schedule is upward sloping.

Elasticity

- ***Price elasticity*** of demand is an elasticity that *measures the **responsiveness** of the quantity demanded of a good to its price*.
  - **In general, a fall in the price of a good is expected to increase the quantity demanded, so the price elasticity of demand is negative as above (negative slope).**
  - **A commodity is a Veblen good if people's preference for buying it increases as a direct function of its price.**
    - **Why might this occur?**

Elasticity will usually be negative to demand because as price increases demand usually decreases. The sign of elasticity will be the slope direction of the curve.

There ae two types of goods for which people believe the demand actually increases as the price increases. These are called Veblen Goods and Griffin Goods.

We can see this in some luxury goods but that's not exactly what is being expressed here. An example might be gas. As the cost of gas increases lower income people are forced to pay a higher percentage of their income toward gas. This means they will spend less on maintenance of the car. Less maintenance means lower gas mileage which increase the demand for gas among that group.

Another example might be grain in a poorer economy. As the cost of grain increases people are able to afford less bread but at the same time farmers feeding grain to their cattle must also pay more. This increases the price of beef which takes beef out of the affordable price range of the population. Now the population is forced to demand more bread, which has increased in price but is still lower than beef prices. This increased demand for bread tends to increase the price of bread further.

This could also happen to a company. If a company in a competitive market sees one of it's inputs increase in price it may not be able to pass this increase along to it's customers. Therefore it has to divert money away from some other area. This may make the company less efficient. This may require the company to demand more of the things which are costing it more. (kind of a strech)

Most of the time the demand curve has a down slope.

Elasticity

- ***Demand is inelastic whenever the elasticity coefficient is less than one***.
- When ***it is greater than one, economists say that demand is elastic***.
- Products that have few substitutes generally have a lower elasticity of demand than products with many substitutes.

"A large elasticity" refers to a very steep downward slope.

Substitutes have lower elasticity of demand, back to the idea that you have to pay regardless of the price.

Elasticity

- ***Price elasticity of supply measures the responsiveness of the quantity supplied of a good to its price***.
  - **In general, an increase in the price of a good is expected to increase the quantity supplied, so the price elasticity of supply is positive as above.**

Suppose a company has an increasing cost of debt but it's stock price is skyrocketing. In this case the company is likely to issue stock, but not debt. Will not take on new debt.

Vertical Supply Curve

- ***It is sometimes the case that the supply curve is vertical***
  - **The quantity supplied is fixed, no matter what the market price.**
  - **For example, the amount of land in the world can be considered fixed.**
  - **Therefore, there is zero elasticity.**
  - **Can we think of more examples?**

We have a particular commodity or good. Regardless of the price or demand there is a limited amount. Real Estate is a classic example of this. The is **ZERO ELASTICITY**.

Supply and demand will be very important in what we will be discussing in the latter part of the class.